Main Astronomical Observatory
National Academy of Sciences of Ukraine
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Main Astronomical Observatory of the NASU

- 03143 Kyiv, ak. Zabolotnogo str. 27
- Abbreviated name MAO-UA

MAO 80
Main Astronomical Observatory of the NAS of Ukraine (Golosiiv or Holosiiv Observatory unofficial name)

General remark.

What determines the level of a scientific institution?

-Leaders

-Infrastructure

-Social spirit

How does this relate to the Main Astronomical Observatory of the NAS of Ukraine(MAO-UA)?

Institute overview

Key mission and Core areas of astronomical research of the MAO-UA have been transformed over time

MAO-UA is a relatively young institution compared to classic astronomical observatories.

It has gone through several stages of its development:

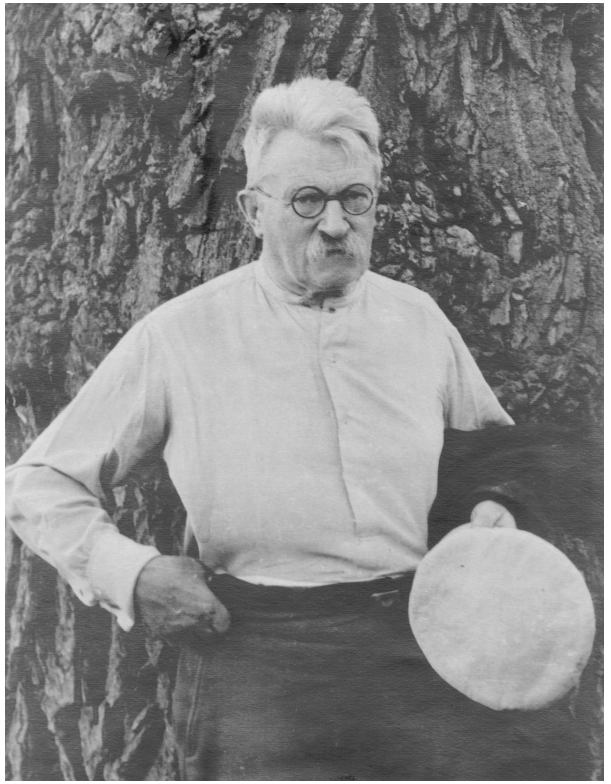
A. Creation and definition of scientific topics (1944-1948).
B. New research trends (1948- 1958).
C. First challenges of the space age (1959-1974).
D. New initiatives and their implementation (1975-1990).
E. New era of astronomy in Ukraine (1991-2023).
F. And now (2024 and beyond).

Oleksandr (Aleksandr) Orlov, the first leader and a member of the Ukrainian Academy of Sciences (since 1919).

- Graduated from St. Petersburg University (1902);
- Director of the Main Astronomical observatory of the Academy of Sciences of the Ukrainian RSR (1944-1948) and (1951-1952).
- **Positional astronomy and latitude variations**

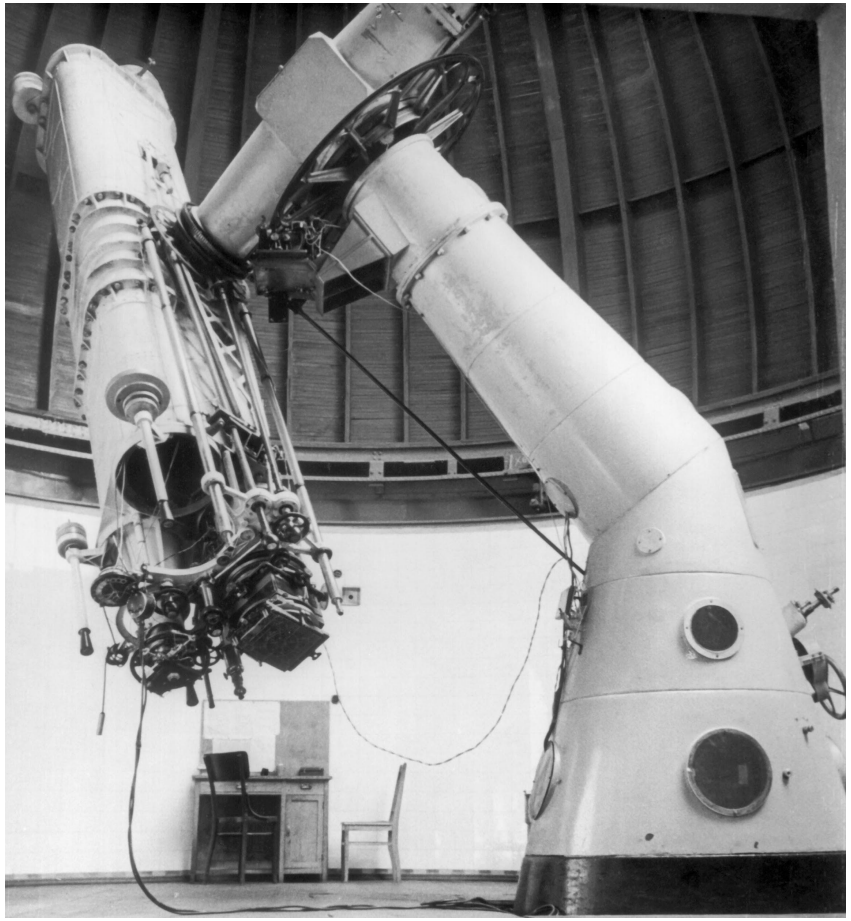
Catalog of faint stars and latitude variations
Research on the astroclimate in Holosiiv.

Installation of the first telescopes.



(1880-1954)

Wanschaff Vertical Circle (WVC)
Long-focus Double Astrograph (LFDA)



New research trends (1948-1959)

Volodymyr Tsesevich, prominent researcher of variable stars .

- Graduated from Leningrad University (1927) and worked there (until 1944);

-Director of MAO-UA (1948-1951).

The beginning of astrophysical research.

(1907-1983)

Avenir Yakovkin, well-known astronomer-researcher of figure and dynamics of the Moon.

- Graduated from Kazan University (1910);
- Director of MAO-UA (1952-1959).

(1987-1974)

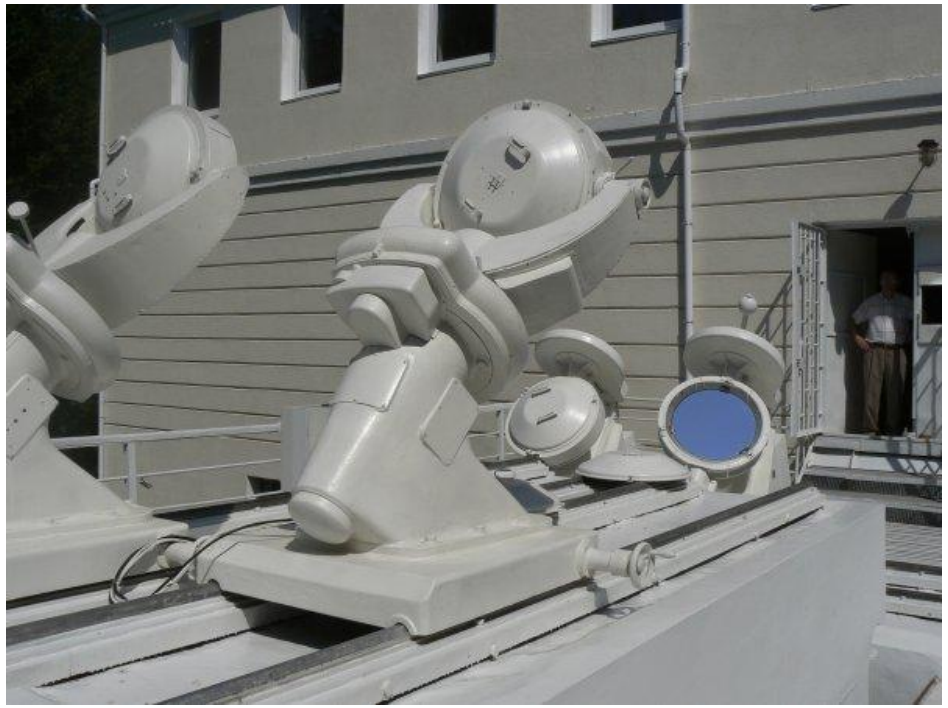
The MAO-UA thematic plan includes new areas of research initiated by M. Barabashov, A.Yakovkin and E.Gurtovenko, respectively

- Photographic study of planets;
- Study of the Moon;
- Solar physics.

Ernest Gurtovenko

-Graduated from Kyiv University (1952);

Field of research - Spectral studies of the Sun.



(1928-1994)

Space era challenges. New initiatives and their implementation (1959-1990)

Yevgen Fedorov.

- Graduated from Irkutsk University (1937);
- Director of MAO-UA (1959-1973).

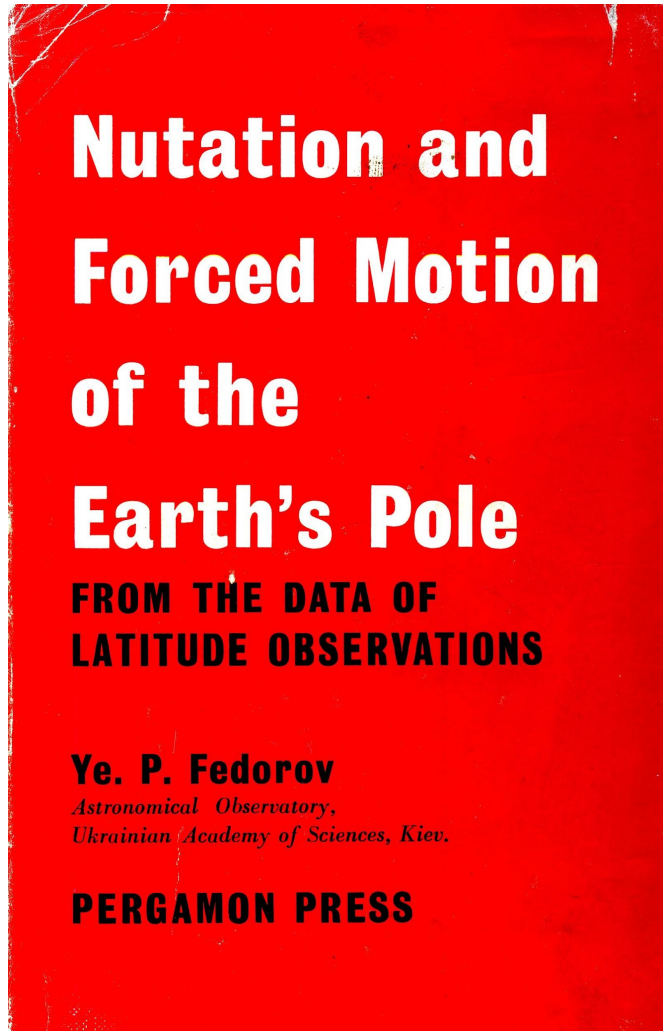
World recognized researcher of nutation and polar motion.

(1909-1986)

Special remark

On the initiative of Ye. Fedorov, international cooperation was established with astronomical centers around the world.

Pergamon Press published the book “Nutation and Forced Motion of the Earth’s Pole” by Ye. Fedorov.



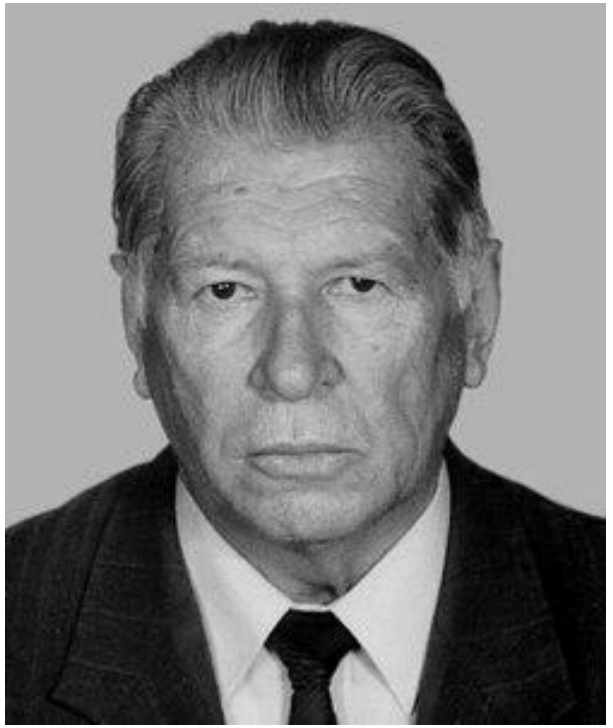
At the MAO, new telescopes and instruments were put into operation, namely telescopes AZT-2 and AVR-2, a Small Solar Telescope, microphotometers, etc.

Due to the development of space research in the USSR, observations of the Moon and planets were intensified to create their models. (I. Gavrilov, I. Koval).

Ivan Koval.

- Graduated from Kharkiv University (1929);
- Director of MAO-UA(1973-1975);

Field of research – Physics of planets.

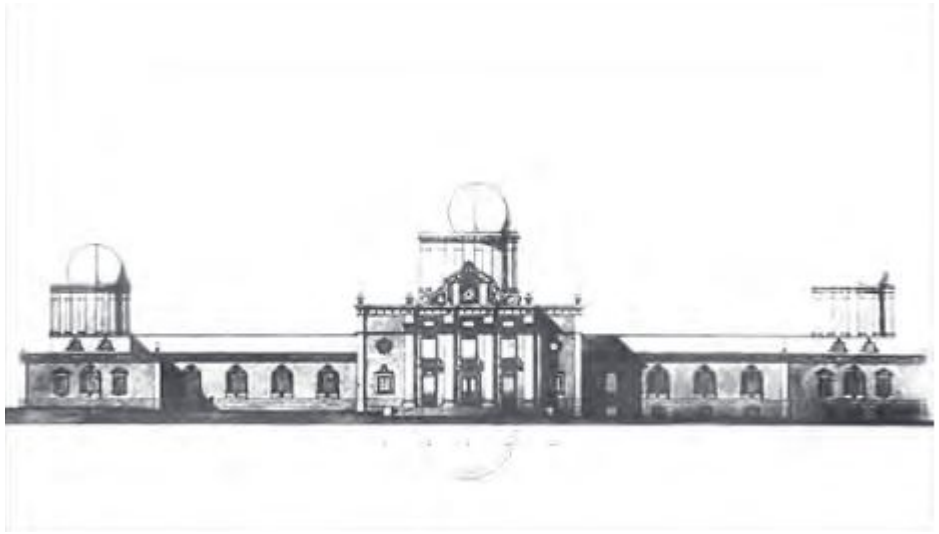


(1929-2020)

Important changes in the mid-70s

A new Double Widefield Astrograph (DWFA) was purchased and installed (1973).

Start of construction of the MAO laboratory building (1974).



1947

1977

MAO-UA observation complexes (after modernization)

- SLR
- HST
- 2.0 m. C.Zeiss telescope
- AZT-2

New laboratory and residential buildings

- Administrative building
- Research and design office building
- 5 residential buildings

New scientific journals

- Kinematics and Physic of celestial bodies
- Space Science and Technology
- Science and innovation

Role in Ukraine's national research ecosystem

MAO-UA is a multidisciplinary astronomical scientific institution of the country, which performs ground-based and space-based observations as well as theoretical studies of celestial objects of the Universe. It coordinates the activity of other institutions in this field of science. Confirmation of the high level of achieved results of impact at the national level is a) powerful publication activity - 7th and 10th place in the Rating of educational and research institutions of Ukraine by h-index in the WoS and Scopus systems, respectively (see, https://nbuviap.gov.ua/bpnu/); b) prestigious awards - the Academician M.P. Barabashov Prize of the NAS of Ukraine (2023) and Academician E.P. Fedorov (2024) and the Prize of the President of Ukraine (2020) and the Prize of the Verkhovna Rada of Ukraine (2023) for young scientists. At the international level, MAO represents Ukraine in many astronomical organizations and consortia (e.g., the CTA and the LISA space observatory, confirmation is attached), and the results of the impact contributed to obtaining international grants in 2023-2024 as EURIZON

(https://www.eurizon-project.eu/sites/sites_custom/site_eurizon/content/e102469/e121028/e271219/e271221/Finalreportforpubl Polish AS and USA NAS (https://www.nationalacademies.org/news/2023/06/eighteen-ukrainian-research-projects-selected-for-long-term-funding-by-the-polish-academy-of-sciences-and-u-s-national-academy-of-sciences).

The results of the impact are provided by observations of objects in the Universe, where MAO scientists were the authors or co-authors of the tasks set. Telescopes of MAO (laser ranger, solar ACU-5) and Ukrainian institutions (UTR-2 IRA NASU (Kharkiv) and Zeiss-2000 ICAMER (Terskol, RF) in 2021-2022) were used, as well as other countries, including VLT (Chile), Skymapper (Australia), 1.3-m (Slovakia), the Institute of Astrophysics in the Canary Islands (Spain), VLA (USA) and space observatories (Chandra, Hershel, Spitzer, Hubble)

Staff structure (researches, engineers, admin)

Divisions

Division 1. Research departments

1.1. Department of astrometry and space geodynamics **(10/3/-)**

1.2. Department of atmospheric optics and instrumentation **(8/4/-)**

1.3. Department of substellar and planetary systems **(9/1/-)**

Including Laboratory of physics of small bodies of the Solar system **(5/1/-)**

1.4. Department of Solar physics **(14/1/-)**

1.5. Department of physics of star and galaxies **(12/2/-)**

1.6. Department of extragalactic astronomy and astroinformatic **(6/-/-)**

Including Laboratory of large-scale structure of Universe **(7/1/-)**

Laboratory of hight energy astrophysics **(7/-/-)**

Division 2. Scientific and educational departments.

2.1. Laboratory of methodological and informational security **(3/4/-)**

2.2. Astrocomputing center **(2/5/-)**

Division 3. Administrative and general affair (4/20/26)

Astronomy of Ukraine at the turn of the XX-XXI centuries

- In 1991, as concerning with the acquisition of independence by Ukraine, the significant changes took place in organization of science and education in our country. The Ukrainian Astronomical Association (UAA) was established as a national committee of astronomers, which represents Ukraine in international organizations, namely IAU and EAS. Through its influential role, UAA helps to promote the interest of Ukrainian astronomy and to define the priorities of research strategies as the Road Map.
- At the same time, the Ukrainian astronomy lacks support in the new challenges at the national level due to economical constrains and the need to integrate, more broadly, into the world astronomy.

Astronomy of Ukraine at the turn of the XX-XXI centuries

The situation worsened even more after the occupation of Crimea by Russia and the unleashing of the Russian-Ukrainian war in the east of Ukraine. This led to the termination of cooperation with Russian astronomers, which traditionally has been very wide.

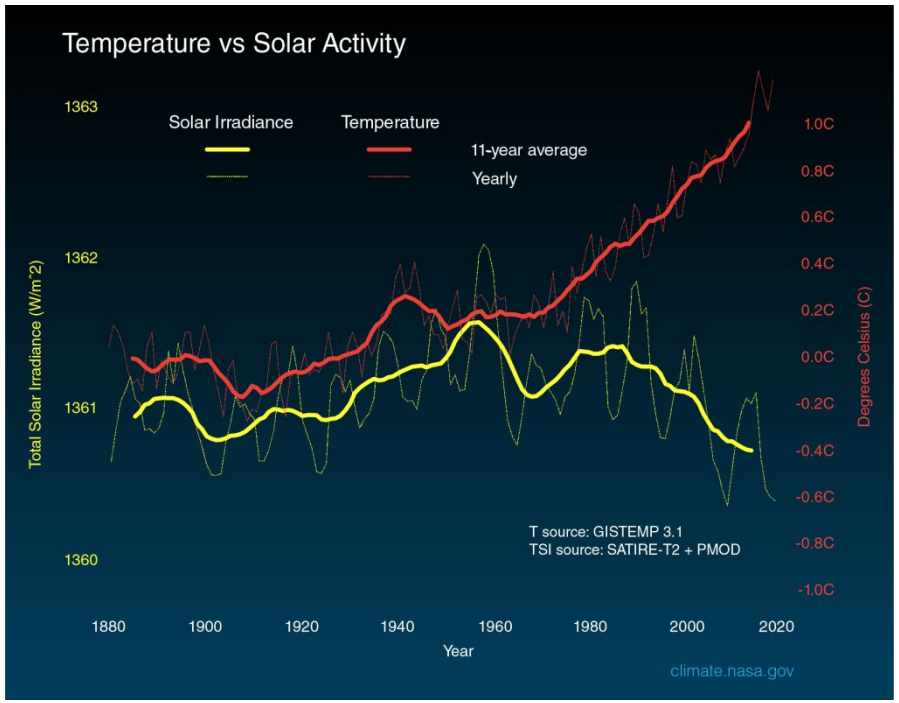
All these factors resulted in a significant reduction in the training of astronomical personal, in a reduce of funding the design and construction of telescopes and instruments, as well as intensive brain drain (abroad or another research fields in Ukraine).

Short-term priorities of astronomical research in Ukraine

- **Low Frequencies radio astronomical research of various objects of Universe.**
- **Study of long-term variations of the Sun radiation in the optical range of frequencies**
- **Study of selected celestial bodies based on photometric and spectrophotometric observations**
- **Study of the early stages of the Universe, its evolution and formation of the large-scale structure**
- **Exploration of the near Earth space based on various types of observations of artificial and natural celestial bodies**

Study of long-term variations of the Sun radiation in the optical range of frequencies

Preparation of a special research program for the study of long-term variations in solar radiation and their impact on climate changes



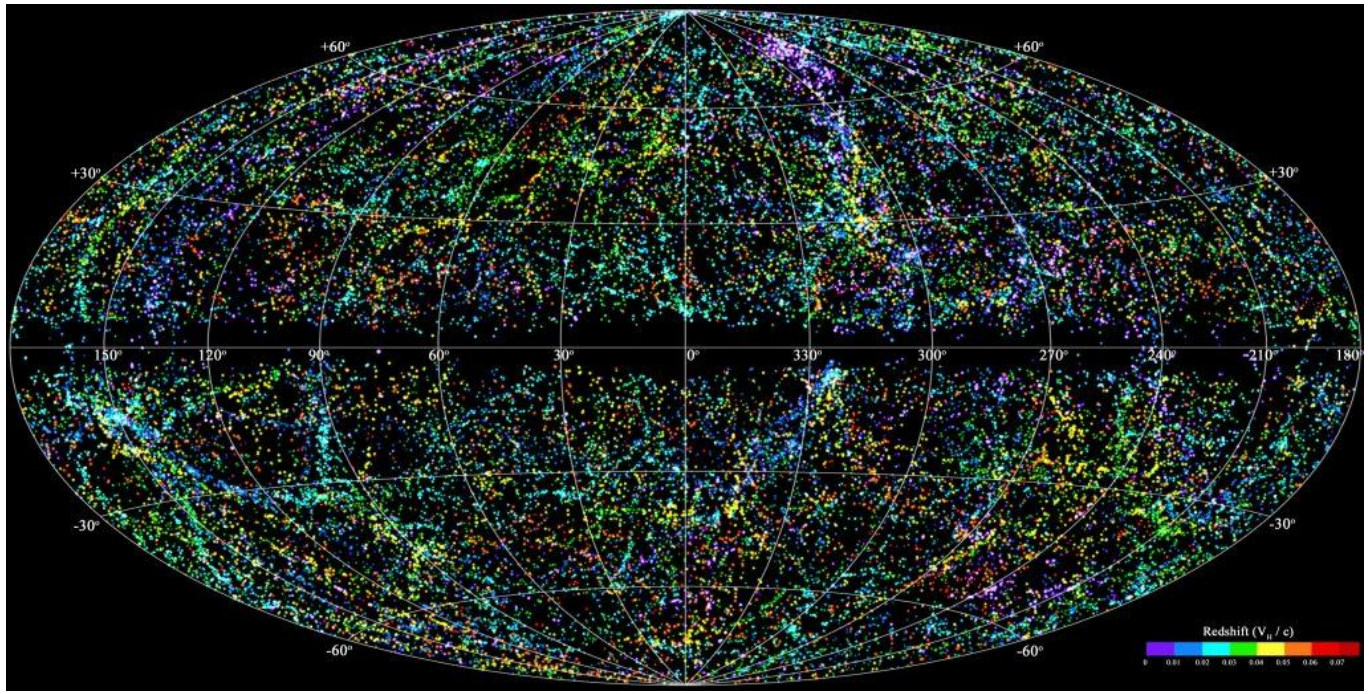
Study of selected celestial bodies based on photometric and spectrophotometric observations

Observation equipment modernization

of AO ONU, AO KhNU, AO KNU, MAO and others.

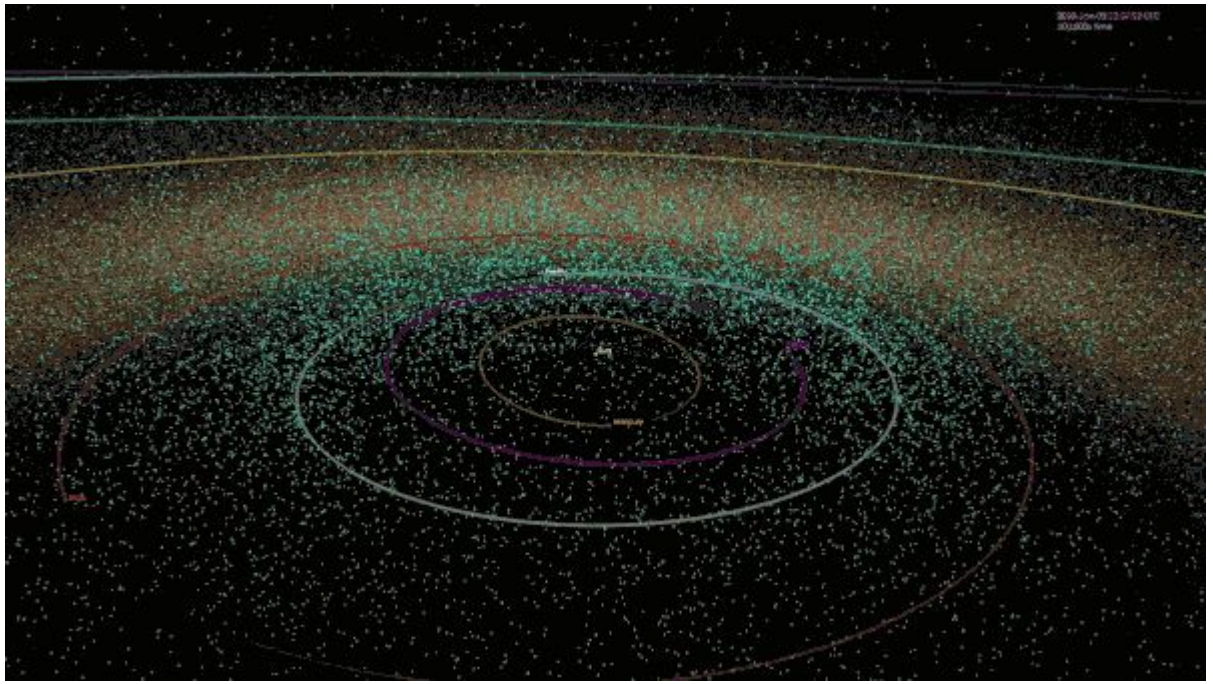
Study of the early stages of the Universe, it evolution and formation of large-scale structure

Stimulating international cooperation with the development of research in cosmology, extragalactic astronomy and astroinformatics



Exploration of the near Earth space based on various types of observations of artificial and natural celestial bodies

Formation of national programs for near-Earth astronomy, namely UMOS, SKAKO, SKO and their coordination with EU.



Long-term priorities of astronomical observations in Ukraine

- **Further development of the ground-based and space radio astronomy**

Collaborative observations in the **URAN** and **GURT** systems. Space project **BRAUDE-Selena** implementation. Development of astronomical research with **RT-32** (Zolochiv)

- **Projects for study of ionosphere and global climate changes**

Collaborative space projects **MicroSat**, **Aerosol-UA**

- **Participation in the formation of international astronomical databases and the implementation of various studies on their basis.**

Creation and support of the activities of a National center of astronomical data (**UkrVO?**)

- **Formation of a promising target program for the development of ground-based and space astrophysical research.**

Proposal for the creation of an observational base (in Ukraine or abroad), equipped with modern telescopes, to National Fund of Research of Ukraine (**infrastructure project**), target programs of the NAS of Ukraine

- **Development and implementation of modern instruments and technologies for astronomical observations**

Creation of a special design office and pilot production of modern techniques for astronomical observations.

Current status and priority needs

- Monitoring observations on national and international projects:

GNSS, SLR, ACU-5, STT

- Gaps in funding (up to 50% of wages)
- Weak recruitment of young employees.

Impact of the war has so many faces, namely loss of scientists, destruction of infrastructure, psychological trauma etc.

Despite this we are working as circumstances permitting.

- Vision for recovering

There is no certainty that the war will end in the coming years.

- Specific needs and proposal for partnership.

Resume the active work of the International Center of Astronomical and Medical-Ecological Research with the involvement of European institutions (instead of russia)


Thank you!